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SHEEP FEEDING.

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SHEEP FEEDING.

In feeding all classes of sheep there are general details that contribute toward satisfactory results. Among these may be included all those things that are conducive to the general health of the sheep, such as considerate treatment, cleanliness of troughs and racks, healthfulness of the quarters in which the sheep are kept, regularity in feeding, and the use of such accessories as salt, pure water, and sulphur.

FEEDING BREEDING EWES.

To enter into detailed discussion of the feeding of breeding ewes it will be best to divide the topic according to the season, and in this way present the subject of winter, spring, summer, and fall feeding. Under climatic conditions permitting the breeding flocks to have pasture throughout the year, what may be termed summer feeding would largely prevail at all times, so with such an understanding local conditions will not necessitate much variation from the course of feeding suggested. .

WINTER FEEDING OF BREEDING EWES.

Breeding ewes require 10 to 15 square feet of space in a building, and ewes weighing from 150 to 200 pounds should have an allowance of 1.5 feet at the feeding rack. Less than this causes too much crowding at feeding time, which often results in the birth of dead lambs.

Breeding ewes need not be fed more than twice daily. It is a good practice, however, to feed them some fodder outside during the winter season, for in this way they are induced to take some exercise. With this in view the fodder may be taken some distance from the building in which the sheep are housed.

In a practical way, the shepherd should regulate the quantity of food according to the condition of the ewes. If they have gone into winter quarters in thin condition, they should be fed more heavily than if they were fat at that time. Handling the ewes at intervals furnishes the best indication as to their condition, and this will indicate the quantity of food that should be fed. In the author's experience the aim has always been to keep the breeding flocks in a condition which the general farmer would term "fat," and only good results in lambs have come from this management. When ewes are firm fleshed, through abundant

feed and exercise, they are vigorous, and a healthy flock of lambs is likely to be the outcome. In general, a breeding ewe weighing 150 pounds requires daily about one-half pound of such grain as bran and oats, 2 pounds of succulent food, and the same weight of such dry fodders as clover hay or cut corn fodder. As lambing time approaches, twice this amount of grain will be required. The quality of the fodder and grain will have an influence on the amounts to be fed, but the controlling factor should be the condition of the ewes. Overfeeding, especially if associated with lack of exercise, will be productive of disease in the flock, and it is likely to result in the birth of large weak lambs, while underfeeding is equally favorable for disease and the birth of undersized lambs. Overfeeding may produce sterility, while underfeeding delays the breeding season. The vigorous, firm-fleshed condition which results from liberal feeding and unlimited exercise is the aim of the experienced flock master.

Coarse fodders.—Among the fodders for winter feeding may be mentioned clover hay, pea straw, corn fodder, oat hay, oat straw, and millet. As to their relative merits, based on cost, the nourishment in them for sheep and more especially the preference of the sheep for them are about in the order given.

At the Wisconsin Station 6 lots of Shropshire breeding ewes, with 4 ewes in each lot, were fed one-half pound of bran or oats and from 2.5 to 3.1 pounds of succulent food per head daily. In addition to this each lot received its distinctive coarse fodder, consisting of either alsike clover hay, corn fodder cut into inch lengths, cut or uncut oat hay, oat straw, or blue-grass hay. The sheep were very fond of the fine, well-cured alsike clover hay, and left only 16 per cent as refuse. Each ewe ate daily 2 pounds of alsike clover, 2.8 pounds of corn silage with 0.5 pound of oats and bran daily, which at the customary prices cost 1.5 cents. The ewes averaged 177.2 pounds in weight at the beginning and 196.2 pounds at the end of the experiment.

The ewes on the cut corn fodder (ears removed) ate 1.75 pounds of corn fodder, 3.1 pounds of sugar beets, and 0.5 pound of oats or bran daily, costing 1 cent. Their weight at the beginning averaged 152.4 pounds and at the end 163 pounds. The refuse, consisting mostly of the thick parts of the stalks, was 20 per cent. We have fed corn fodder extensively, and the sheep seem to like it and thrive well on it.

The ewes on uncut oat hay ate 2.1 pounds of the hay, 2.5 pounds of corn silage, and 0.5 pound oats or bran, costing 1.2 cents. They averaged 175.6 pounds in weight at the beginning and 194.7 pounds at the end. The refuse was 32 per cent. The lot receiving the cut oat hay ate 1.5 pounds cut oat hay, 2.4 pounds of corn silage, and 0.5 pound oats or bran, costing 1.2 cents. They averaged 177.3 pounds at the beginning and 182 pounds at the end of the trial. The refuse amounted to 35 per cent. No advantage was gained by cutting the oat hay, and one of the objections to it was that the small pieces of straw would get into

the neck wool, cause it to mat and, in some instances, drop away. The oats were cut when green, the kernel being just filled.

The lot on oat straw ate 1.1 pounds of this daily, together with 3.1 pounds of sugar beets, and 0.5 pound of oats or bran, costing 0.8 cent. They averaged 155.5 pounds at the beginning and 156.5 pounds at the end of the experiment. The refuse was 22 per cent. When supplemented with the proper amount of grain and succulent food, oat straw may be utilized for maintaining breeding ewes, but it is best to have other fodder to feed at intervals.

The ewes receiving blue-grass hay ate 1.5 pounds of the hay, 3.1 pounds of sugar beets, and 0.5 pound of oats or bran, costing 1.3 cents. They averaged 148.2 pounds in weight at the beginning and 153 pounds at the end of the trial. The refuse was 6.2 per cent. The sheep apparently were not fond of this hay, although the grass is eagerly eaten as it grows in the pasture.

Pea straw is greatly relished by sheep, and in nutritive value it leads all the other fodders mentioned, with the exception of the clover. In Canada, where the pea crop is a general one, the straw is put away especially for the sheep, and it is fed more extensively, perhaps, than any other fodder, with good results.

The hardness of the stems of timothy hay seems to be one of the reasons why sheep do not care much for this fodder. They never appear to be eager for it, and if given any latitude in choice they will leave it untouched in favor of any of the other fodders, with the possible exception of oat straw.

Grains.—For the best results in thrift, wool growth, and lamb production, the breeding ewes should get some grain during the winter season. They can hardly be kept in proper condition otherwise. A good plan is to feed oats the first part of the winter, and then bran as lambing time approaches. About 0.5 pound of oats during the first of the winter and near lambing time 1 pound of bran per head daily will be sufficient for breeding ewes weighing from 150 to 200 pounds. These are the two most satisfactory grain foods that are generally available, both in respect to cost and results. Corn is not a satisfactory grain to feed ewes, as it produces too much fat, which apparently tends to accumulate internally and impair the breeding qualities and lessen the general vigor, instead of imparting tone to the system.

Succulent foods.—Some succulent food should be fed to breeding ewes at all times, though it is very easy to feed them too much just previous to lambing. When turnips or silage are fed to breeding ewes in too liberal quantities, weak lambs are likely to result. Before lambing, 3 pounds of any succulent food, such as mangel-wurzels, sugar beets, corn or clover silage, will be found sufficient. After lambing, unlimited quantities of these may be fed, to stimulate the milk flow.

Turnips are relished by the sheep, and the author prefers them for sheep feeding to any other roots. Sheep are very fond of any of the

varieties of Swedish turnips, and also relish mangel-wurzels near springtime. Sugar beets are satisfactory if fed in small quantities. In our trials we have found that a ewe would eat daily 3.3 pounds of sugar beets, with 1.5 pounds of hay and 0.5 pound of oats or bran, costing about 1.3 cents. The ewes that were fed this ration averaged from 150 to 160 pounds.

Corn or clover silage, when well preserved, is a succulent food that may be fed to sheep with satisfactory results. It is cheap, is liked by the sheep, and if fed in quantities not exceeding 3 or 4 pounds per head daily it will give satisfaction. The corn kernels in the silage are one of the drawbacks to feeding it liberally. In our trial with corn silage it was found that ewes weighing about 150 pounds ate daily 2.2 pounds of the silage, 1.5 pounds of hay, and 0.5 pound of oats or bran, costing 1.1 cents. Ewes of similar weight receiving clover silage ate 2.6 pounds clover silage, 1.5 pounds hay, and 0.5 pound of oats or bran, costing 1.2 cents. They gained more on the clover silage. The refuse from the corn silage was 6 per cent of all that was fed, and from the clover silage nearly 13 per cent.

As to the relative effects of silage and roots on the milk flow, the experiments at the Wisconsin Station were without very decided results. At the New York Cornell Station this feature was studied more fully. As between mangel-wurzels and corn silage, the lambs sucking the ewes fed roots made slightly better gains than those sucking ewes fed silage, although the silage appeared to be the cheaper ration. As between beets and corn silage, the lambs of the ewes fed silage made slightly the larger gain in weight. These results show but a meager difference in the feeding value of these foods.

SPRING FEEDING OF BREEDING EWES.

If the ewes lamb before the conditions are such that they may be turned out to pasture, they will require liberal feeding, which means about 1 to 1.5 pounds of bran, 2 pounds of hay, and as much succulent food as they will eat. It is very desirable to maintain a heavy flow of milk, and to do this, grain feeding and the free use of succulent food are necessary while the sheep remain in the sheds.

Pasturage.—It is generally good management to turn the ewes and lambs out to pasture as soon as possible, provided some grain is fed to the ewes while the grass is in a very succulent state. There is not sufficient nourishment in it at this time to properly support the ewes that are suckling lambs.

It is advisable to so stock the pastures with sheep that none of the grass may grow too coarse. On the other hand, overstocking injures the pasture and makes the conditions favorable for diseases. Frequent change from one pasture to another will be found advisable.

Feeding grain to ewes on pasture.—When the pasture ceases to consist altogether of a fresh growth peculiar to an early spring, there is no

advantage in feeding the ewes grain. In our experiments with 40 ewes and 56 lambs it was found that the lambs did not make any greater gain when their dams were fed grain on good pasture. The only compensation for feeding grain to the ewes was in the fact that those receiving grain did not lose as much in flesh as the others. But this greater loss was easily made good again when the ewes were put on rape or pasture after the lambs were weaned.

SUMMER FEEDING OF BREEDING EWES.

In the summer management of the breeding flock there is nothing of more importance than a provision of some green fodder to supplement the dry and parched pastures that are common in most sections in the summer months. For this purpose the crops most commonly utilized are rape, rye, corn, and vetches.

Rape.—This crop is one that has many advantages for summer feeding breeding ewes. It grows rapidly, produces a large quantity of succulent food, and is greatly relished by sheep. About two months is required for the growth of a crop. It remains fresh in the field for over a month under usual conditions after the first cutting has been made. At the Wisconsin Station 62 ewes, 26 ewe lambs, and 5 rams were fed from 300 to 350 pounds of rape daily throughout the drought of August and September. From August 16 until September 17, 9.75 tons by actual weight were cut from 0.5 acre, or at the rate of 19.5 tons per acre.

In cutting rape at different heights, the best results were obtained from cutting about 4 inches from the ground. Two cuttings were made from the piece so treated, one August 29 and the other November 6, and the yield was at the rate of 36 tons per acre.

Rye.—The writer has known a rye pasture to be in good condition after being used six years for pasturing sheep. The rye was never allowed to grow beyond the second joint of the stalk. If the sheep did not keep it down, it was cut. It furnished unusually early pasturage for sheep, and was at all times acceptable. Rye grows quickly, will establish itself in poor soil, and is eagerly eaten by sheep if it is not allowed to become rank. It may be used as a soiling crop at any time, but with special advantage if sown in the corn at the last cultivation, so as to be ready in the spring before the pastures are in condition to turn the sheep on them.

Vetches.—These are not as indifferent to climatic conditions as the crops previously mentioned, but where they can be grown they are invaluable for soiling sheep. They are very nutritious, and sheep thoroughly relish them. Mixed with one-third oats, with the object of supplying supports for the vines, they can hardly be surpassed as a soiling crop. In the drier sections, where the need of soiling crops is greater, the vetches can not be made to produce the amount of fodder that rape does.

Feeding ewes after weaning the lambs.—When the lambs have been taken away from the ewes, the latter should be put on scanty pasture or given the range of a field of grain stubble, to dry up the milk as soon as possible. The ewes, if they have done well by their lambs, will be in poor condition at this time, but it is not advisable to give them full feed.

FALL FEEDING OF BREEDING EWES.

It is a general impression among shepherds that the condition of the ewes at the time of breeding has a marked influence on the succeeding crop of lambs. If the ewes are in vigorous condition and improving in flesh, the prospects are thought to be favorable for the production of a large percentage of lambs. It is equally accepted that the condition of the ewes in the fall prior to going into winter quarters has an effect on the susceptibility of the flock to such diseases as are more or less prevalent during the winter season. It is certain that the ewes may be gotten into vigorous condition much more cheaply and easily in the early fall than at any time later, and it is equally true that a vigorous condition is the best preventive of disease.

Grain.—As the breeding season approaches (it usually begins in October), the ewes, being in thin condition, require some grain. The best grain for this time is clean sound oats, about 0.5 pound per head daily. If the ewes are brought into a uniformly good condition by grain feeding they will breed uniformly, which of itself is an appreciable advantage. During the past season, out of the flock of 55 breeding ewes at the Wisconsin Station, 52 lambed in the month of March, and this was due chiefly to the uniformity in the condition of the ewes, brought about by rape feeding.

Fall pasturage.—It is advisable to keep some fresh pasturage for late fall feeding. Exercise in the fall is conducive to thrift in winter and healthy lambs in the spring. In our northern climate sheep are housed too much at best. The ewes may obtain more food than would be supposed from a field of fresh blue-grass pasture that has been in part retained for them.

It is becoming an opinion among shepherds that when ewes are fed on clover aftermath they are more difficult to get with lamb than if fed on other pasture or fed soiling crops. In addition there is danger that the sheep may bloat on it. The best plan is to save the second-crop clover for the lambs that have been weaned; and to prevent bloating pasture them for a part of the day on blue-grass pasture, and after they have satisfied their appetites to some extent, to change them to the clover.

FEEDING LAMBS INTENDED FOR BREEDING PURPOSES.

When the ewe has lambed, if the lamb after becoming dry is not able to obtain the ewe's milk of its own accord, it should be assisted in doing so. Some of the milk should be drawn from the udder to see that the

milk escapes freely, and then the lamb held so that it may reach the teat. If it is too weak to stand, the ewe may be thrown, but it is perhaps better to draw some of the milk from the udder and feed it to the lamb from a spoon. By feeding a teaspoonful every hour for a half day or so, most weak lambs soon become strong enough to get to the teat themselves. It should be seen that there is no dirty wool around the udder or any filth about the teats to prevent the lamb from sucking. In the case of young ewes it is especially necessary that attention be paid to these matters. It is advisable to keep the ewe and her lamb in a pen by themselves for at least three days.

For feeding lambs to be used for breeding purposes preference should be given to bran, oats, and linseed meal. These are preferable to corn meal, which tends to fatten and does not produce growth to the same extent as the other foods. The bran is relished by the lambs, and they may eat large quantities of it without danger or detriment of any kind. Linseed meal is best fed in a mixture with the bran, as it is very rich and concentrated. Oats are seemingly liked by the lambs, but they will not eat them as freely as the other foods mentioned. If the oats are ground, the lambs leave a considerable quantity of the chaff untouched. The best results will likely be obtained by giving an equal mixture by weight of bran, oats, and linseed meal.

At first the lambs will take only small quantities of grain. By feeding them very little at a time and always taking away what they may leave they soon begin to eat eagerly and look forward to feeding time. To give young lambs all they have capacity for requires frequent feeding in small quantities. When the lambs are yet in the shed and not on pasture, our practice in feeding has been about as follows: In the morning about 6 o'clock they are fed a small quantity of grain, in the trough. After the other sheep are fed, if the lambs have eaten their grain more is put in the trough. At noon they receive another allowance. In the evening they are fed twice in the same manner as in the morning, and they are left at night with some grain in their troughs.

When the lambs are about 8 weeks old, they will eat about 0.17 pound of grain per head daily; when 10 weeks old, about 0.25 pound, and when 12 weeks old about 0.5 pound.

Hand-feeding lambs.—In rearing lambs that have lost their mothers, or when the latter do not give enough milk to nourish the lambs properly, it is best to feed cow's milk from a bottle that has a small rubber nipple attached to it. A newly dropped lamb only requires 2 teaspoonfuls at a time given every hour. It has not been found necessary to sweeten the milk with sugar or dilute it with water, but it is strongly recommended to heat the milk and feed it at a temperature of 100° F. The lambs seem to like it hot, and they certainly thrive better upon it. It is necessary to keep the nipple, the bottle, and the vessel in which the milk is heated thoroughly free from any disagreeable taste or odor, such as that of sour milk, else the lambs will refuse the milk. When

the lambs are about 2 months old they are able to take in two feeds 2 pints per head daily, in addition to such grain and grass as they may eat.

Feeding after weaning.—The time for weaning the lambs depends greatly upon the extent to which the lambs are obtaining milk from the ewes. When they are four months old they may usually be weaned with advantage. If they have been fed grain previous to weaning they will not be checked in their growth by it and they will be almost unconscious of the weaning; but if they have not received grain they will lose in weight and be checked in their growth.

It will be advisable to separate the ewe lambs from the ram and wether lambs. If allowed to run together the ram lambs will annoy the others and the gains will not be satisfactory. The wether and the ewe lambs may be kept together.

After weaning, the lambs should be gradually made to rely on oats as their grain ration. If on pasture of only ordinary quality, 0.5 pound of oats daily may be fed if needed, but if on good aftermath clover or blue-grass pasture less will be required.

When the lambs have just been weaned they should get the best pasture obtainable, and if possible the field should be some distance from the ewes. There is nothing better for lambs just weaned than second-growth clover that has grown up a few inches and has lost some of the freshness characteristic of new growth. There is not much danger of lambs of this age bloating on such food. Rape is an excellent food for the ram lambs, and if managed with judgment there is no danger in giving them free range. If neither of these can be secured for the lambs, they should at least have a clean piece of blue-grass pasture that has not been eaten down by other stock.

The best practice among shepherds giving close attention to the growth of their lambs is to sow rye in the fall for early food in the spring for the ewes and lambs, followed by vetch and oats and by vetch sown alone at intervals of two weeks. These last until the lambs are weaned and the clover aftermath is ready for them. Succeeding this comes the rape crop and fall turnips.

Feeding during winter.—During the first winter the ewe and ram lambs should receive special care. The aim should be to encourage growth as much as possible by good feeding without making them fat. Some grain, preferably oats, and wholesome fodders, such as clover hay, cut corn fodder, and others that they relish, should be fed. Until they become matured the ewe and ram lambs should be fed liberally, for any loss in growth that they may suffer through scrimped or neglected feeding can never be regained in later life.

FEEDING RAMS.

In feeding mature rams it is desirable to maintain them in a thrifty and vigorous condition without fattening. This implies wholesome food and exercise. If rams are made too heavy in flesh at any time,

impotency or inability to serve ewes frequently results, and if they are once overfed and made too fat it is a very hard matter to reduce them without serious injury to their vitality. Exercise and not the reduction of their ration is the best remedy for reducing the flesh.

Winter feeding.—During the winter the object should be to maintain the weight if the ram is mature, and if a shearling or young ram to make continuous improvement. Oats are probably the best grain food, though the addition of some bran is advisable. A mature ram will need from 0.5 pound to 1 pound of grain daily to keep him in proper condition.

The fodders should be chosen so as to give as much variety as possible. They may include clover hay, pea straw, corn fodder, and others, fed at different intervals, or, perhaps better, one in the morning and another in the evening. Some succulent food should also be fed, such as turnips or silage. Experienced shepherds are very decided upon the danger from feeding mangel-wurzels. A great many rams have died from a formation of crystals in the bladder, and these have frequently been traced, it is believed, to the feeding of mangel-wurzels.

Summer feeding.—To secure the best results in the breeding season it is not advisable to let the rams run with the ewes before that time. They should be pastured as much as possible, for in this way they will keep healthier and stronger on their legs. Though the fleeces of the rams that run out may not appear to as good advantage as if housed, yet for results in breeding it is much the better plan to keep them on pasture as much as possible. They should get some grain, the amount depending on their condition.

Fall feeding.—The feeding of the rams during the breeding season is very important. The grain should be mostly oats, with the addition of some bran and linseed meal. Such fodders as vetches and rape, fed in the shed, are recommended. The breeding season is a severe strain on the vitality of the ram, which has to be met by liberal feeding of grain and other foods in as great variety as possible. About 1 pound of grain daily will be required, with as much green food as the ram will eat. At this time it has been the writer's plan to keep the rams in pens by themselves and only allow them to go to the ewes each morning. Pasturage is replaced altogether by such green foods as rape and clover cut and brought to the pens.

FEEDING LAMBS FOR MARKET.

In feeding sheep for market the important consideration is the profit, and that depends on many circumstances. The feeding value of different foods, their cost, and the time occupied in fattening and marketing the sheep, are perhaps the most influential. It will be advisable to consider (1) the feeding of lambs that are to be sold to an early market some time during the interval from birth to weaning, (2) lambs intended for the fall market, and (3) those fed until they reach the period of their fullest development, which is usually when they are about 1 year old.

FATTENING LAMBS FOR THE EARLY MARKETS.

In preparing lambs for the early markets the best gain, to my knowledge, is that made by 3 lambs at the New York Cornell Station, which made a weekly gain per head of 5.36 pounds, extending over a period of nine weeks. Another lot of 3 made an average weekly gain of 4.47 pounds per head, extending over a period of twelve weeks. In neither case, however, is the composition of the ration or the amount of grain reported. The best gain in the writer's experience at the Wisconsin Station has been made by 4 lambs that were fed a mixture by weight of 4 parts of bran, 4 parts of corn meal, and 1 part of linseed meal. When the experiment started, the lambs were about 3 weeks old, and they were fed for ten weeks on this grain ration, receiving in addition the milk of their mothers. The average weight of each lamb at the beginning of the experiment was 18.6 pounds, and at the end, 62.5 pounds, an average weekly gain per head of 4.48 pounds. They each ate 26.6 pounds of the grain mixture during the ten weeks, costing 18 cents per head.

The results that come next to these in profit were obtained from feeding a grain mixture consisting of 2 parts of ground wheat and 1 part of ground corn by weight. The lambs were about four and one-half weeks old when the experiment started, and averaged 26.1 pounds in weight. When the experiment ended, fourteen weeks later, they averaged 77 pounds in weight, having made an average weekly gain per head of 3.63 pounds. They each ate 40.5 pounds of the grain mixture in the fourteen weeks, costing 33.3 cents.

Another lot of 5 lambs, about six weeks old at the beginning, fed a mixture of equal parts of bran and linseed meal before weaning, made an average gain of 40.9 pounds in twelve weeks, or a weekly gain of 3.4 pounds, per head. They ate 50 pounds of the grain mixture per head, which cost 37 cents.

In another trial with 14 lambs a mixture of bran, corn meal, and linseed meal gave an average weekly gain of 3.1 pounds, extending over a period of twelve weeks. During the first three weeks the mixture was 3 parts of bran and 1 part of linseed meal, and during the remaining nine weeks it was 2 parts of bran, 1 part of corn meal, and 1 part of linseed meal. The lambs each ate 42.7 pounds of the mixture during the twelve weeks, which cost 34 cents.

Considering these results, it is clear that corn meal is the leading food to feed young lambs for quick and profitable fattening. Bran probably ranks next, and with these linseed meal may usually be fed in small quantities to advantage.

FATTENING LAMBS FOR THE FALL MARKETS.

Under some conditions it may not be profitable to put the lambs on the market early or to carry them over winter, but it may be better to sell them in November, before housing is required. The best weights

that we have obtained at the Wisconsin Station with lambs fed until November have been made by the lambs previously mentioned as receiving bran, corn meal, and linseed meal before weaning. After weaning they were fed 2 parts of ground corn and 1 part of linseed meal by weight. On November 19 each lamb averaged 102.7 pounds in live weight, and in the nineteen weeks that elapsed since weaning they had made an average weekly gain of 2.66 pounds per head. They each ate 183 pounds of the grain mixture, in addition to pasturage, at a cost of \$1.47 per head for the grain.

Linseed meal and cotton-seed meal.—In a comparison of these, in addition to corn meal for fattening lambs after weaning, a weekly gain of 3.3 pounds per head was obtained from the mixture of 2 parts of corn meal and 1 part of linseed meal, and 2.95 pounds per head from the mixture of 2 parts of corn meal and 1 part of cotton-seed meal, with pasturage. In the ten weeks' feeding the 5 lambs on the linseed-meal mixture had eaten 432.5 pounds of grain, while those receiving the cotton-seed-meal ration ate 346.5 pounds of grain. In the last five weeks there were only 4 lambs in the latter lot. The cost of gain, exclusive of pasture, would be at the rate of \$2.09 per 100 pounds for the linseed-meal ration and \$2.25 for the cotton-seed-meal ration.

Oats with pasturage.—The feeding of oats to lambs being fattened on pasture after weaning has given us returns that are close to the foregoing ones. In one trial 5 lambs attained an average weight of 99.8 pounds in sixteen weeks after weaning, making an average weekly gain of 2.1 pounds per head. Before weaning they had been fed a grain mixture of bran, ground corn, and linseed meal, of which they ate 42.7 pounds, costing 34 cents per head, and after weaning they ate 6.9 pounds of the same mixture and 120.9 pounds of whole oats, costing \$1.13 per head.

In another trial, 5 lambs being fattened on pasture after weaning were made to weigh an average of 97.6 pounds by November 8. In the twelve weeks before weaning they had gained an average of 3.4 pounds weekly by eating 50 pounds of equal parts of linseed meal and bran, costing 47 cents, and after weaning they received whole oats and pasture. During the fourteen weeks so fed they made an average weekly gain of 1.4 pounds, and they ate 52.1 pounds of oats per head, costing 56 cents.

More economical results were obtained by restricting the amount of oats to 0.5 pound per head daily while the lambs were on good pasture. In the trial in which this amount was fed the 5 lambs gained during the twelve weeks 1.35 pounds per head weekly. They each ate 42 pounds of oats, costing 36 cents. These lambs were made to average 93.3 pounds by November 9. They were the same lambs previously described as being fed ground wheat and ground corn before weaning.

Cotton-seed cake and corn meal with pasturage.—In experiments at Woburn, England, conducted in behalf of the Royal Agricultural Society of England, trials extending over seven years have been made

in fattening lambs with these foods in addition to pasturage on clover that had been seeded the previous year. Each year three or four lots of sheep in groups of 10 were annually fed off the acre of pasturage, with the following average results:

	Pounds.
680 pounds of undecorticated cotton-seed cake fed with 1 acre of pasturage gave an average increase of	376.5
728 pounds of corn meal fed with 1 acre pasturage gave an average increase of. 377.1	
No additional food with 1 acre of pasturage gave an average increase of 264.1	

These results indicate that the feeding of these foods in addition to pasture would be profitable, and that the rate of gain, being 55.3 pounds per 100 pounds of cotton-seed cake and 51.7 per 100 pounds of corn meal, is slightly in favor of the former, while the cost of gain is favorable to the corn meal.

Fattening lambs on rape.—There are exceptional possibilities in well-grown rape for fattening lambs, if it is fed with proper judgment and care. It may be fed to best advantage in the early fall, and hence is of valuable assistance in fattening lambs for the fall or early winter market. It supplies a vast amount of food that the lambs are very fond of, and as it withstands drought and early frost better than most succulent fodders it is a crop that may be relied upon with at least common certainty. The first trials reported with rape for fattening lambs were made in England about 1845. Ten wethers fed on rape alone from August 10 to September 21 made an average increase in the six weeks of 20 pounds, or 2 pounds per head weekly.

The most extensive trials in feeding lambs on rape have been carried on at the Ontario Experimental Farm. In 1890, 54 acres of rape pastured 17 head of steers and 537 sheep, and 1 acre of the rape sustained 12 lambs for two months. It is estimated that the food provided by an acre of rape was worth \$16.80. In another trial, rape alone was fed to 60 lambs, and they were kept on 2.18 acres for twenty-five days, during which time they increased in weight 390 pounds, or an average weekly increase per head of 1.82 pounds. Again, in an experiment on one-sixth of an acre, 6 lambs were kept for forty-two days, and from this it is concluded that 1 acre would have pastured 36 lambs two months and have made 762 pounds of mutton.

At the Michigan Station 15 acres of rape pastured 128 lambs for seven and a half weeks, with a total gain of 2,890 pounds. At this rate it is estimated that 1 acre would pasture 9 lambs seven weeks, and they would produce 202.5 pounds of increase. It is stated that the field would unquestionably have pastured 10 lambs for the period of ten weeks.

Rape and pasture.—At the Ontario Station an experiment was tried in feeding rape alone against rape and pasture. Thirty lambs comprised the two lots, the one being put on an acre of rape and the other given a similar amount with pasture. In fifty-eight days both lots had eaten their respective acres, but the 15 on rape alone gained an average

of 22.93 pounds per head, and those receiving rape and pasture 28 pounds per head, thus showing the advantage of having pasturage for the sheep to graze when being fed on rape.

Rape and oats.—At the same place 15 wethers were fed on an acre of rape, with 0.5 pound of oats in addition. Besides eating almost the whole of the crop from an acre in fifty-eight days, they also consumed 345 pounds of oats, and gained 23.67 pounds per head, or a weekly increase of 2.8 pounds per head.

Rape with corn and oats.—At the Wisconsin Station 16 wethers were fed on 0.7 of an acre of rape for twenty-five days, and also ate 153.5 pounds of oats and 97.5 pounds of whole corn. They gained a total of 149 pounds, or a weekly average of 2.6 pounds. Valuing the foods and the wethers at cost, and the selling price of the latter at 4 cents per pound, the rape would be worth \$14.48 per acre.

Rape, wheat, oats, and linseed meal.—At the Wisconsin Station 21 wether lambs were fed on 0.5 acre of rape for ten weeks. They ate in addition a total of 1,439 pounds of the grain mixture, and made a total gain of 413.5 pounds, or a weekly gain slightly less than 2 pounds per head. Valuing the food at current prices, and estimating the lambs to be worth 3 cents per pound when they were put on the rape and 3.5 cents when taken away, the 0.5 acre would be worth \$10.12, or an acre \$20.24.

When these wethers had eaten the crop on 0.5 acre they were put on another piece that had been sown broadcast. One-tenth of an acre was eaten in two weeks, with 160 pounds of ground wheat, 160 pounds of linseed meal, and 160 pounds of ground oats, and the 21 wethers gained 142 pounds, or a weekly gain of 3.3 pounds per head.

Precautions necessary in feeding rape.—When sheep are being herded on rape there is danger of bloating or diarrhea from excessive eating. Pasturing the sheep for a few hours previous to turning them on the rape, or allowing them to have the range of a small piece of pasture at all times, will assist in preventing these troubles. The use of the trocar and cannula is the most efficient method of relieving bloat in urgent cases, while in mild attacks the giving of ammonia, a teaspoonful in three times as much water, will usually bring relief.

SHEARING WETHER LAMBS BEFORE FATTENING THEM.

When lambs are being fattened early in the fall or in preparing them for winter fattening, it is a profitable practice to shear them before the fattening begins. At the Ontario Experiment Station 10 lambs sheared in January made practically the same gain in weight as 10 others not shorn and similarly fed. At the Wisconsin Station no advantage has been found from shearing in December. Those shorn yielded a total of 2 pounds less washed wool than the others and made a total gain of 2.7 pounds less than the wethers that were not shorn; and the cost of 100 pounds of gain was \$4.70 for the shorn and \$4.40 for the unshorn lots.

Shearing in November.—Shearing the wether lambs before fattening them in this month proves to be of slight advantage. The wethers that were shorn made 7 pounds more gain than those left unshorn, but the cost of gain was \$4.44 per 100 pounds in comparison with \$4.17 in the case of those that were not shorn. One advantage noted was the rapid fattening of the shorn wethers after shearing and during the first half, or first eight weeks, of the feeding period.

Shearing in October.—It was found decidedly beneficial to shear lambs in this month before fattening them. Five wethers were shorn October 14 and fed for fifteen weeks against another lot of 5 left unshorn. The shorn lot gained 225.5 pounds and the unshorn 210.5 pounds, or an average weekly gain per head of 3 pounds for the shorn and 2.8 pounds for the unshorn. The cost of 100 pounds of gain was \$6.11 with the shorn lot and \$6.67 with the unshorn. In another trial with 16 wethers, 8 were shorn October 6, and the same number left unshorn. In ten weeks' feeding the shorn lot gained 194.4 pounds, or 3.4 pounds per head weekly, while the unshorn lot gained 169 pounds, or 3 pounds per head weekly. In both of these trials in October and in the November trial it was observed that the removal of the fleece hastened the early maturity or fattening of the wethers up to the time the fleece had again grown over 1 inch in length, or until about eight weeks had passed.

FATTENING WETHER LAMBS TO MATURITY.

Preparation for fattening.—It is the common practice on most farms to withhold grain from the lambs for a time before and after weaning, in the belief that they will make quicker and more profitable gains while being fattened later. For four years we have fed lambs at the Wisconsin Station from birth until slaughtered, and have kept accurate account of their food and gain, so as to understand the influence of grain feeding at all times. The evidence is clear that the greatest and most profitable gain is made in the younger days of the lamb, and that the feeding of such food as bran, linseed meal, and oats before weaning and a small quantity of oats after weaning not only pays in direct profit if the lambs are sold at any of these times, but the fattening later is none the less profitable because of this management.

Feeding grain before weaning has produced an average of 61 cents per head more profit at weaning time than where no grain was fed. With lambs sold in the fall, feeding grain both before and after weaning produced an average of 34 cents per head more profit than where no grain was fed.

Feeding such foods as oats, bran, and linseed meal before and after weaning did not influence the gain during the fattening period, which usually extended over three months. The cost of gain, however, was 29 cents per 100 pounds cheaper in the instance of the lambs that had not been fed grain.

One of the most profitable features of grain feeding lambs previous

to fattening was observed to be the earlier maturity of those that had had grain from birth. For instance, in one trial the lambs fed grain from birth attained an average weight of 113 pounds seven weeks earlier than those that had had no grain previous to fattening, and this weight was reached at a smaller cost in the instance of the lambs fed grain from the start.

System of feeding.—There is unlimited variation in general practice in regard to this point. It has been our custom to feed the grain first, then the succulent food, and last the dry fodder. In feeding fattening sheep of the age indicated the aim should be to induce the wethers to eat as much as possible. At this time they should receive all the grain they will eat up eagerly. To secure the best results it is a good plan, where it is possible to do so, to feed the grain in two or even three feeds. This may be done easily when less than 100 are fed together, but with more than that it is not a commendable plan. By feeding only one-third of the full feed intended it is easy to gauge the appetites of the wethers, which is a very important matter. The smallest degree of overfeeding is certain to react on the gain of the sheep, for in some instances it will probably cause scouring, in others constipation, and it may even result in the loss of some of the lambs.

Essentials in management.—There are two essentials that contribute to cheap and rapid gains, and these are quietness and confinement. The least excitement brought on by the appearance of dogs, haste, or abuse on the part of the attendant is certain to be shown by the scales. For some time the Wisconsin Station used yards in connection with the fattening pens, but for the last two years they have been removed, and better results seem to have followed.

Quantity to feed.—Careful attention must be given to the amount of grain that is fed. This part of the ration costs most, gives the quickest returns, and is the most likely to produce some disorder in the digestion of the sheep. For the first two weeks it is much better to give them only one-half what they need than to feed them too much; especially is this true if over 50 sheep are being fed together. Starting the sheep safely and well on a ration brings the feeder's skill into play, particularly if the sheep have been unaccustomed to grain. There are some foods that are safer than others to feed at the beginning, and among these oats or bran have a general preference. Wheat is comparatively safe, while corn is probably the most dangerous to feed alone. One pound per head daily of either bran or oats is liberal feeding for sheep that are accustomed to grain, and a slightly smaller quantity will be sufficient for those that have not been accustomed to it. The quantity of grain may be gradually increased as the capacity of the sheep to consume it becomes greater. The careful and successful feeder trains his sheep to eat with as much carefulness as the trainer teaches a colt to trot. It is safe to assume that wethers at this age may be fed all the grain that they will eat, as it is usual for them to profitably utilize it in

making gain, unless they are unhealthy or the management is defective. It is a hard matter to estimate the amount of grain to feed, owing to the variation in the consuming capacity of sheep. In starting it has been our custom to feed from 0.5 pound to 1 pound. A month later the wethers will probably be taking 1.5 to 2 pounds, and during the last month from 2 to 3 pounds per head has been the capacity of most of the sheep we have had in experiments.

Cost and value of the increase.—In comparing foods for fattening sheep it has been the custom to compare them on the basis of the cost of 100 pounds of gain, overlooking the increased value per pound which the sheep realizes in the market because of the increase that has been made during the feeding period. It is but a moderate advance to accept 3 cents per pound as the cost price of feeders and 4 cents per pound as the selling price when ready for market. Thus each pound that cost 3 cents when the feeding began becomes worth 4 cents at the close of the feeding, owing to the better condition of the sheep, which increases the percentage they will dress. This better condition is produced by the foods that are fed, so that in estimating the profits from any ration the ration should be credited with this increased value per pound of the sheep. Calculations of profit in succeeding experiments here mentioned have been made on this basis.

Fodders for fattening wether lambs.—There is no doubt as to the preference of the sheep in the choice of fodders, but there is no experimental data upon which to base conclusions as to their relative values. Clover hay seems to be the fodder they relish most, then pea straw, corn fodder, and timothy hay. The condition of the fodder will materially influence the gain, for if it is musty, burned, or dusty, or has been allowed to grow too coarse, they will neglect it. Two or three pounds of any of the fodders mentioned will be about the quantity that wether lambs 9 or 10 months old will eat daily through the fattening period.

Succulent foods for fattening lambs.—When being fattened wether lambs should have some succulent food in their ration for the reason that they will remain healthier and not be troubled with the common disorder called stretches, and they will usually make a better gain. It is very seldom that a group of sheep may be fattened on dry food without some of them dying or suffering with constipation.

At the New York Cornell Station two lots of 5 lambs each, about 8 months old, were fed alike, except that one lot had corn silage and the other hay. In nineteen weeks the lot on silage gained a total of 132.5 pounds; the other lot gained 124 pounds in the same time. The silage ration was estimated to be the cheapest. Four pounds of silage were considered to be equivalent to 1 pound of hay.

The value of roots in a ration was shown by trials at the Michigan Station, in which corn and hay were compared with corn, roots, and hay. Ten sheep on the former gained 328 pounds in fifteen weeks, as compared with 397 pounds on the corn, roots, and hay. The profit was about 3 cents per head more for the latter lot.

In other trials at the same station corn and linseed meal were fed with hay, against the same kind of grain and hay with roots. Ten lambs on the hay ration gained 357 pounds in fifteen weeks, while 10 on the hay and roots gained 392 pounds. In this case the profit was greater without than with the roots.

At the Wisconsin Station a ration of oats, corn, and linseed meal with hay was fed against a similar ration containing roots. The 4 lambs fed the former ration made a weekly average gain of 2.64 pounds per head and those fed the ration with roots made a weekly gain of 2.48 pounds per head. The profit was about 2 cents per head more from the ration without roots.

These results do not show a decided difference in favor of either ration, but in feeding large numbers the advantage more decidedly appears in favor of the succulent ration because of the decreased risk of deaths due to digestive derangements.

Roots and silage have been compared for fattening wether lambs without any marked difference in their value becoming apparent. If there is any, the rate of gain is in favor of the roots, and the cost of gain is favorable to the silage.

Corn.—This is assuredly the most fattening farm grain that may be fed to sheep. In relying on it alone, however, there is much difficulty in maintaining the appetites of the sheep and in preventing disorders and deaths. Corn, roots, and hay were fed in a ration at the Michigan Station against different rations, and the corn ration gave a weekly gain per head of 2.6 pounds, which was only equaled by a mixture of corn and oats.

Corn and hay were fed for fifteen weeks in trials conducted at the Michigan Station. The 10 wether lambs ate 1,579 pounds of corn and 1,095 pounds of hay and gained a total of 328 pounds, giving a profit of 59 cents per head. At the Wisconsin Station 5 wether lambs ate in eight weeks 427.75 pounds of corn and 288.5 pounds of hay and gained 104.5 pounds, giving a profit of 87 cents per head.

Cracked corn and hay were fed at the Minnesota Station to 10 wether lambs weighing 710 pounds, and in twelve weeks they ate 1,103 pounds of corn and 849 pounds of hay and gained 211 pounds, or an average weekly gain per head of 1.75 pounds. This ration returned a profit of 44 cents per head.

Oats.—In beginning to fatten wether lambs it is safe to feed oats. The lambs like them and they will begin to eat them at once. Fed alone, however, they do not produce as great a gain as corn. Hence, as the fattening proceeds, the quantity of oats should be gradually decreased.

At the Ontario Station 4 wether lambs were fed for fifteen weeks on oats, hay, and roots and gained 156 pounds, or a weekly increase of 2.6 pounds per head. At the Michigan Station 10 lambs fed for seventeen weeks on oats, hay, and roots gained 379 pounds, or a weekly

average per head of 2.2 pounds. At average prices there was no profit in either case.

Oats and Swedish turnips were fed to 5 wether lambs weighing 548 pounds at Rothamsted, England, for ninety-seven days. The lambs gained 130.9 pounds, or an average weekly increase of 1.9 pounds per head, giving a profit of only 3 cents per head.

Crushed oats were fed in feeding trials at Woburn, England, in connection with Swedish turnips and hay chaff, with the result that 8 wethers increased 380 pounds in one hundred and twelve days, or an average weekly gain of 2.9 pounds per head. This high rate of gain appears to have been due to the crushing of the oats. Crushed or "grittled" barley fed to similar sheep gave a weekly gain per head of 2.8 pounds, while whole oats and barley mixed in equal parts and fed in similar quantities to the foregoing gave an increase of 3 pounds per head per sheep, and wheat in the same experiment fed whole in similar quantities produced an increase of 3 pounds per head weekly. The large gains appear to be due to the fact that the sheep were good feeders.

Peas.—The best satisfaction will be obtained from feeding peas when they are split or crushed and fed with other foods. At the Ontario Station 4 wether lambs were fed in fifteen weeks 628 pounds of peas, 1,050 pounds of hay, and 460 pounds of roots, and gained 105 pounds, or an average weekly gain of 1.75 pounds per head. Charging the peas at 60 cents per bushel and the other foods at current prices, 45 cents per head was lost by feeding this ration.

Barley.—This grain has been experimented with for fattening sheep most extensively at the Rothamsted Station, in England. In one trial 5 wether lambs, weighing 602 pounds, ate in eighteen weeks 630 pounds of barley and 1,879 pounds of clover chaff, and gained 139 pounds, or an average weekly increase of 1.54 pounds per head.

At the Minnesota Station 10 wethers weighing 733 pounds ate 1,268 pounds of barley and 630 pounds of hay in twelve weeks, and gained 199 pounds, or 1.65 pounds per head weekly. With barley at 45 cents per bushel and the other foods and the lambs at market prices there was a profit of 13 cents per head.

Ground barley has given slightly better returns. Four wether lambs weighing 519 pounds fed at the Rothamsted Station ate 280 pounds of ground barley and 3,867 pounds of mangel-wurzels in ten weeks and gained 81 pounds, or a weekly increase of 2 pounds per head. The average profit was 51 cents per head. In another trial at the same station ground barley was fed with meadow-hay chaff to 5 wethers weighing 589 pounds. In thirty-two weeks they ate 1,120 pounds of barley and 2,899 pounds of the chaff, and gained 164 pounds, or a weekly increase of 1 pound per head.

Crushed or gritted barley was fed to 8 wethers weighing 959.25 pounds. In one hundred and twelve days they ate 658 pounds of gritted barley, 17,472 pounds of Swedish turnips and 224 pounds of hay

chaff, and gained 365.75 pounds, or an average of 2.8 pounds per head weekly. Charging the barley at 45 cents per bushel and the other foods at market prices, the increased value of the sheep shows that only market prices were obtained for the foods fed in this ration.

Wheat.—In an experiment at Woburn, England, with different rations, including linseed cake, linseed cake and undecorticated cotton-seed cake, crushed oats and barley meal, crushed oats and split beans, and lastly wheat, the wheat gave the largest gains. During the first period of the experiment it was fed in the form of meal, but was afterwards fed whole, with a very noticeable increase in the gains resulting. The 6 wethers fed wheat for one hundred and six days ate 558 pounds of wheat, and, as nearly as can be estimated, 12,720 pounds of roots and 277 pounds of hay chaff, and on this they gained 313 pounds, or an average of 3.4 pounds per head weekly. In another series of experiments at the same place with crushed oats, crushed barley, oats and barley mixed, wheat and oats mixed, and wheat alone, the best results were obtained from the whole wheat. The 8 wethers receiving the whole wheat in one hundred and twelve days ate 658 pounds of whole wheat, 17,920 pounds of Swedish turnips, and 224 pounds of hay chaff, and gained 389.25 pounds, or an average of 3 pounds per head weekly. In the first series the wether lambs fed the wheat ration yielded a profit of 18 cents per head, and in the second 12 cents, rating wheat at 53 cents per bushel.

Small wheat was fed at the Minnesota Station in an experiment to determine the value of the various grains for fattening wether lambs. Ten wether lambs weighing 737 pounds ate in twelve weeks 1,505 pounds of small wheat and 742 pounds of hay, and gained 202 pounds, or an average weekly gain per head of 1.6 pounds. Valuing the small wheat at \$10.56 per ton and the hay at \$8, the profit returned by each lamb was 45 cents. In the same trial wheat screenings was feed to 10 wether lambs weighing 736 pounds, and in twelve weeks they ate 1,776 pounds of the screenings and 609 pounds of hay, and gained 244 pounds, or an average weekly gain per head of 2 pounds. On the same valuation the profit from each wether lamb was 53 cents.

Sheep of all kinds and ages appear to be very fond of wheat bran, probably on account of its flavor and the fact that they digest it easily. Many of the large feeders in the West consider bran one of the safest and best foods to begin the feeding of large numbers, though they only rely on it alone for a few weeks.

Beans.—In the feeding experiments that have been made with beans as the only grain the results have been unsatisfactory. In a trial at Rothamsted, England, ground beans were fed with mangels in comparison with other grains, and a very unsatisfactory opinion was formed of their value, the sheep refusing to eat the beans and losing weight, so that the food had to be changed.

At the Ontario Station 4 wether lambs fed for fifteen weeks on beans, hay, and roots gained 47.12 pounds, or an average of 0.95 pound

per head weekly. This is a very small gain, and as a consequence the ration proved a very unprofitable one.

Linseed cake.—This is a very healthy food for sheep, and they eat it eagerly, especially if it is not ground too fine. When crushed into pieces about the size of peas sheep eat it with relish. There is much difference in the different grades of linseed cake, and for this reason its feeding value varies greatly. In an experiment in England with linseed cake containing 6 or 7 per cent of fat and other containing 15 or 16 per cent, the wethers ate very nearly the same amount of food on both kinds, while the gain with the linseed cake rich in fat was much the greater. It is estimated that this was worth \$5 per ton more than the linseed cake low in fat.

In the trial conducted at Woburn with wheat, crushed oats and barley meal, crushed oats and split beans, linseed cake and undecorticated cotton cake, and linseed cake alone, the linseed cake was only second to the wheat in the rate of gain. The 8 wether lambs fed the linseed-cake ration weighed 916.5 pounds at the beginning of the experiment, and in one hundred and six days they ate 588 pounds of linseed cake and, as nearly as may be estimated, 16,960 pounds Swedish turnips, and the average weekly gain per head was 3.3 pounds, as compared with 3.4 pounds on wheat, 2.6 pounds on crushed oats and barley meal, 2.7 pounds on the mixture of crushed oats and split beans, and 2.7 pounds on the mixture of linseed cake and undecorticated cotton cake. While the linseed-cake ration gave a very high rate of increase, yet it was not a profitable ration, for only market prices were obtained for the foods fed.

In another series of experiments at the same place, in which linseed cake alone and mixtures of it with barley and malt were fed to sheep, the highest rate of increase was obtained from the linseed cake alone.

Results from feeding unmixed grains.—From the results presented in the outline of what had been accomplished in the feeding of single grain foods, it is evident that there are but a few of them that give profitable returns when fed alone. Some give a high rate of gain, but the cost absorbs the profit, and others yield satisfactory gains so long as the sheep will eat them and continue in good health. At the average current prices the indications of the experiments are that corn is much the most profitable single grain to feed, next to which rank such as wheat, cotton-seed meal, or linseed, while most of the others enumerated barely pay returns equal to their market prices, and some, such as beans and bran, fail to do this.

Grain mixtures.—There is abundant evidence indicating that the merit of a grain mixture as a part of the ration lies in the fact that the sheep like it better than the unmixed grains, eat more of it, and as a result gain more. The fact that they eat more seems to be the chief element in making the profit less than in the feeding of some of the foods unmixed.

Peas and corn.—In an experiment in feeding whole corn, corn and peas, corn and oats, and corn, peas, and oats to wether lambs, in addition to hay, the corn gave the poorest results of all, so far as the rate

of gain is concerned, the average weekly gain per lamb being 2.6 pounds on corn, 2.7 pounds on oats and corn, 3.15 pounds on corn and peas, and 3.01 pounds on corn, peas, and oats. The cost of 100 pounds of gain was, corn, \$3.99; corn and oats, \$4.46; corn and peas, \$4.20, and corn, peas, and oats, \$4.46.

Oats and corn.—This mixture is probably more frequently used than any other in the West. In trials at the Michigan Station the 10 lambs receiving corn and oats with roots and hay were only equaled in weekly gains by those fed corn alone. This mixture surpassed bran alone, corn and bran mixed, oats and bran, and another of corn, oats, and bran, in weekly gain and in cost of gain.

At the Wisconsin Station it has been our custom, in fattening lambs that have been fed grain continuously from birth, to feed oats at first during the fattening, then add corn, and finally, if the lambs appeared to need it, to add some linseed meal. In one of the trials corn and oats were fed alone to 15 lambs throughout the fattening (twelve weeks) with hay in addition. They ate 1,523.5 pounds of corn, 1,073 pounds of oats, and 1,320 pounds of hay, and gained 529.5 pounds, or an average of 2.9 pounds per head weekly. The profit on the lambs fed this ration at the Michigan Station would amount to 54 cents per head, while that from those fed in our trials would be 67 cents. These figures indicate that both in direct profit and rate of gain the oats and corn mixture gives results superior to most other mixtures, while observation of the conduct of the wethers when being fed this ration justifies the assertion that it is an exceptionally wholesome food for sheep.

Peas, oats, and corn.—Five wethers fed a grain mixture of peas, oats, and corn with hay made an average weekly gain of 3 pounds per head. The profit was 76 cents per head, which was slightly below that of a lot receiving corn and peas, and also less than that of a lot on whole corn.

Bran, oats, and corn.—This mixture was tried at the Michigan Station in comparison with bran and oats and bran and corn. In the seventeen weeks the average weekly gain was 2.10 pounds per head on bran and corn, 2.11 pounds on bran and oats, and 2.3 pounds on the mixture of bran, oats, and corn. The profit on the bran and corn ration was 21 cents per head, on the oats and bran ration 10 cents, and on the bran, oats, and corn ration 22 cents per head. It will be seen from these trials that the best returns in profit resulted from feeding the corn and bran mixture and the corn, oats, and bran ration, for both of these surpassed the oats and bran.

Wheat and corn.—This grain mixture was fed to one lot of wether lambs at the Michigan Station in comparison with other grain mixtures, and very satisfactory results were obtained from it. Ten wether lambs weighing 800 pounds ate in fifteen weeks 743 pounds of corn, 743 pounds of wheat, and 1,183 pounds of hay, and gained 293 pounds, or an average of 1.97 pounds per head weekly. They gave a profit of 38 cents per head if we charge the wheat at 53 cents per bushel, corn at 40 cents, and hay at \$8 per ton. This is a better return than the oats

and bran, bran and corn, and oats, bran, and corn mixture fed in the same trial.

Corn and linseed meal.—In the above trials at the Michigan Station corn and linseed meal gave high results. Ten wether lambs weighing 829 pounds ate in fifteen weeks 347 pounds of linseed meal, 1,388 pounds of corn, and 1,152 pounds of hay, and gained 357 pounds, or an average of 2.38 pounds per head weekly. A profit of 41 cents per head resulted from feeding this ration. Cracked corn and linseed meal were fed in a ration at the Minnesota Station to 10 wether lambs weighing 722 pounds. In twelve weeks they ate 142 pounds of linseed meal, 1,284.3 pounds of cracked corn, and 634 pounds of hay, and gained 289 pounds, or an average of 2.4 pounds per head weekly. The profit from feeding this grain mixture with hay was 55 cents per head.

Barley and linseed meal.—This mixture was fed in the same experiment as the preceding at the Minnesota Station. Ten wether lambs weighing 757 pounds ate in twelve weeks 159 pounds of linseed meal, 1,431.9 pounds of barley, and 603 pounds of hay, and gained 274 pounds, or an average of 2.2 pounds per head weekly. There was a profit of 13 cents per head, which is not so great as that resulting from the ration containing wheat and linseed meal.

Oats, barley, and wheat.—In the sheep-feeding trials at Woburn, England, oats and barley mixed equally by weight returned a weekly increase of 3 pounds per head, the oats alone 2.9 pounds, barley alone 2.8 pounds, and the oats and wheat 2.6 pounds per head weekly. Wheat alone did the best of all the grains fed, it giving a weekly increase of 3.06 pounds per head.

Corn, oats, and linseed meal.—The results that have been submitted from the feeding of different rations will go far toward justifying the practice we have followed in fattening wether lambs. They would be started on oats, and fed lightly for two or three weeks, then corn would be introduced, and for seven or eight weeks the grain portion of the ration would be corn and oats. During the last two or three weeks linseed meal would be added to the ration, and on this mixture the wethers would be finished. Though this mixture has not been fed in a trial against other grains, in three trials with this ration the average weekly gain per head has been 2.88 pounds, 2.9 pounds, and 2.98 pounds, respectively, and the profit per head has been 93 cents, 27 cents, and 26 cents.

The results of these trials declare corn to be the most profitable grain for fattening sheep. But practice teaches that other grains must be fed with it to maintain the appetites of the sheep and keep them otherwise healthy. It will likely be safest and best under most conditions to start the fattening with oats or bran, then introduce as much corn as possible, and finish the fattening with a mixture containing one part oats, one part oil meal, and three parts corn by weight. The data given in the trials described will indicate what the advantage may be in using other foods under special circumstances.